CLAIMS:

1. A remote intelligent communication device comprising:

a substrate having a support surface;

a ground plane adjacent at least a portion of the support surface;

at least one antenna spaced apart from and interacting with the ground plane; and

an integrated circuit coupled with the antenna, the integrated circuit including a modulator.

2. The remote intelligent communication device according to claim 1 further comprising a dielectric layer intermediate the ground plane and the antenna.

3. The remote intelligent communication device according to claim 1 wherein the ground plane is adjacent substantially the entire support surface.

4. A remote intelligent communication device comprising:

a substrate having a support surface;

a ground plane adjacent at least a portion of the support surface;

an antenna spaced apart from and interacting with the ground plane; and

an integrated circuit coupled with the antenna, the integrated circuit including a receiver.

5. The remote intelligent communication device according to claim 4 wherein the integrated circuit includes a modulator.

6. The remote intelligent communication device according to claim 4 further comprising a power source coupled with the integrated circuit and the ground plane.

7. The remote intelligent communication device according to claim 4 further comprising an encapsulant configured to form a housing with the substrate and encapsulate the antenna and the integrated circuit.

8. A remote intelligent communication device comprising:

an insulative substrate;

a conductive layer over the insulative substrate and having outer peripheral edges;

a dielectric layer over the conductive layer; and

an antenna over the dielectric layer and having outer peripheral edges received within the periphery of the device.

9. The remote intelligent communication device according to claim 8 wherein the outer peripheral edges of the antenna are received within the confines of the outer peripheral edges of the conductive layer.

10. The remote intelligent communication device according to claim 8 further comprising transponder circuitry conductively bonded with the antenna.

11. The remote intelligent communication device according to claim 8 further comprising:

a power source having a ground terminal; and

at least one conductive connection configured to electrically couple the conductive layer and the ground terminal.

12. An electronic communication device adapted to receive electronic signals comprising:

a housing comprising a substrate and an encapsulant;

an integrated circuit provided within the housing and comprising transponder circuitry operable to communicate an identification signal responsive to receiving a polling signal;

an antenna provided within the housing and being coupled with the transponder circuitry; and

a ground plane provided within the housing and being spaced from the antenna and configured to shield some of the electronic signals from the antenna and reflect others of the electronic signals towards the antenna.

13. The electronic signal communication device according to claim 12 wherein the ground plane has a first side facing away from the antenna and configured to shield the electronic signals from the antenna, and a second side facing the antenna and configured to reflect the electronic signals to the antenna.

14. The electronic signal communication device according to claim 12 wherein the electronic signal communication device comprises a remote intelligent communication device.

15. The electronic signal communication device according to claim 12 wherein the electronic signal communication device comprises a radio frequency identification device.

16. The electronic signal communication device according to claim 12 further comprising a power source within the housing and coupled with the integrated circuit and the ground plane.

17. The electronic signal communication device according to claim 12 wherein the housing has a thickness less than about 0.090 inches.

18. A radio frequency identification device comprising:

an integrated circuit including a receiver, a modulator and a processor;

an antenna operably coupled with the integrated circuit and configured to at least one of transmit and receive electronic signals; and

a conductive layer spaced from and configured to interact with the antenna.

19. The radio frequency identification device according to claim 18 further comprising a dielectric layer intermediate the antenna and the conductive layer.

20. The radio frequency identification device according to claim 18 further comprising a power source having at least two terminals, and the conductive layer being coupled with at least one of the terminals.

21. The radio frequency identification device according to claim 18 wherein the antenna defines a plane, wherein the conductive layer is substantially planar, and wherein the conductive layer is substantially parallel to the plane defined by the antenna.

22. The radio frequency identification device according to claim 18 wherein the radio frequency identification device has a thickness less than about 0.090 inches.

23. A radio frequency identification device comprising:

an integrated circuit comprising transponder circuitry operable to communicate an identification signal responsive to receiving a polling signal;

an antenna coupled with the transponder circuitry; and

a ground plane spaced from the antenna.

24. The radio frequency identification device according to claim 23 further comprising a dielectric layer intermediate the antenna and the ground plane.

25. The radio frequency identification device according to claim 23 further comprising a power source having at least two terminals, and the ground plane being coupled with the integrated circuit and one of the terminals.

26. The radio frequency identification device according to claim 23 wherein the antenna defines a plane, wherein the ground plane is substantially planar, and wherein the ground plane is substantially parallel to the plane defined by the antenna.

27. The radio frequency identification device according to claim 23 wherein the radio frequency identification device has a thickness less than about 0.090 inches.

28. A radio frequency identification device adapted to receive electronic signals, comprising:

transponder circuitry;

an antenna operably coupled with the transponder circuitry; and

a ground plane spaced from the antenna and configured to shield some of the electronic signals from the antenna and reflect others of the electronic signals towards the antenna.

29. The radio frequency identification device according to claim 28 wherein the antenna defines a plane, wherein the ground plane is substantially planar, and wherein the ground plane is substantially parallel to the plane defined by the antenna.

30. The radio frequency identification device according to claim 28 further comprising a dielectric layer intermediate the antenna and the ground plane.

31. The radio frequency identification device according to claim 28 further comprising a housing configured to encapsulate the transponder circuitry, the antenna and the ground plane, and the housing having a thickness less than about 0.090 inches.

32. The radio frequency identification device according to claim 31 wherein the housing comprises a substrate and an encapsulant.

33. A radio frequency identification device comprising:

a substrate;

a conductive layer over at least a portion of the substrate;

a dielectric layer over the conductive layer;

an antenna over the dielectric layer;

an integrated circuit electrically coupled with the antenna; and

a battery having a ground terminal electrically coupled with the integrated circuit, the conductive layer being electrically coupled with the ground terminal through the integrated circuit.

34. The radio frequency identification device according to claim 33 wherein the conductive layer is positioned to shield some of the electronic signals from the antenna and reflect others of the electronic signals toward the antenna.

35. The radio frequency identification device according to claim 33 further comprising an encapsulant forming a substantially void-free housing with the substrate.

36. A radio frequency identification device comprising;

an insulative substrate having a support surface;

a ground plane over the support surface of the insulative substrate, the ground plane having outer peripheral edges;

a dielectric layer over substantially the entire ground plane;

a conductive trace upon the dielectric layer, the conductive trace forming at least one antenna having outer peripheral edges provided within the confines of the outer peripheral edges of the ground plane and the antenna being configured to at least one of transmit and receive electronic signals, the ground plane being positioned with respect to the antenna to shield some of the electronic signals from the antenna and reflect others of the electronic signals toward the antenna;

an integrated circuit supported by the substrate over the dielectric layer and including transponder circuitry and a processor, the transponder circuitry being coupled with the antenna and comprising a modulator and a receiver, the modulator being configured to communicate an identification signal responsive to receiving a polling signal at the receiver, the processor being configured to process the polling signal;

a battery supported by the substrate over the dielectric layer and having a power terminal and a ground terminal individually electrically coupled with the integrated circuit, the ground plane being electrically coupled with the ground terminal through the integrated circuit; and

a cured encapsulant over the conductive trace, the integrated circuit, the battery and a portion of the dielectric layer, the encapsulant and the insulative substrate forming a substantially void-free housing.

37. A method of forming a remote intelligent communication device comprising:

providing a substrate having a conductive layer on a support surface thereof;

forming a dielectric layer over the conductive layer;

forming a conductive connection through the dielectric layer and connected to the conductive layer;

forming an antenna over the dielectric layer; and

conductively bonding an integrated circuit to the conductive connection and the antenna.

38. The method of forming a remote intelligent communication device according to claim 37 wherein the conductive bonding of the integrated circuit to the conductive connection and the antenna comprises a single bonding step.

39. The method of forming a remote intelligent communication device according to claim 37 wherein the forming of the conductive connection and the antenna comprises printing conductive material in a common printing step.

40. A method of forming a remote intelligent communication device comprising:

providing a substrate;

forming a ground plane over the substrate;

forming an antenna supported by the substrate and spaced from the ground plane; and

conductively bonding an integrated circuit and the antenna.

41. The method of forming a remote intelligent communication device according to claim 40 further comprising conductively bonding the integrated circuit with the ground plane.

42. The method of forming a remote intelligent communication device according to claim 40 further comprising electrically grounding the ground plane.

43. A method of forming a remote intelligent communication device comprising:

providing a substrate;

forming a ground plane over the substrate;

providing an insulating layer over the ground plane; and

printing an antenna upon the insulating layer over the ground plane.

44. The method of forming a remote intelligent communication device according to claim 43 further comprising printing at least one conductive connection through the insulating layer while printing the antenna.

45. The method of forming a remote intelligent communication device according to claim 43 further comprising encapsulating the antenna and a portion of the insulating layer.

46. A method of forming a radio frequency identification device comprising:

providing a substrate including a conductive layer;

forming a dielectric layer over the conductive layer;

forming an antenna over the dielectric layer;

coupling an integrated circuit including with the antenna; and

encapsulating the antenna and integrated circuit.

47. The method of forming a radio frequency identification device according to claim 46 further comprising grounding the conductive layer.

48. The method of forming a radio frequency identification device according to claim 46 wherein the encapsulating comprises:

flowing a flowable encapsulant over the antenna and integrated circuit; and

curing the encapsulant.

49. The method of forming a radio frequency identification device according to claim 46 wherein the encapsulating comprises enveloping the antenna and integrated circuit into a substantially void-free mass.

50. A method of forming an electronic signal communication device comprising:

providing a substrate having a support surface;

providing a conductive layer adjacent at least a portion of the support surface;

providing a dielectric layer over the conductive layer;

providing an antenna over the dielectric layer;

coupling an integrated circuit with the antenna; and

encapsulating the antenna, the dielectric layer, and the integrated circuit within encapsulant material.

51. The method of forming an electronic signal communication device according to claim 50 wherein the encapsulating comprises:

flowing encapsulant material over the antenna, dielectric layer, and integrated circuit; and

curing the encapsulant into a substantially solid mass.

52. The method of forming an electronic signal communication device according to claim 50 wherein the electronic signal communication device comprises a radio frequency identification device.

53. The method of forming an electronic signal communication device according to claim 50 wherein the electronic signal communication device comprises a remote intelligent communication device.

54. The method of forming an electronic signal communication device according to claim 50 further comprising:

providing a power source; and

coupling the conductive layer with the power source.

55. The method of forming an electronic signal communication device according to claim 50 further comprising providing the conductive layer adjacent substantially the entire support surface.

56. A method of operating a radio frequency identification device comprising:

providing an antenna;

coupling an integrated circuit with the antenna;

using the antenna, at least one of transmitting and receiving electronic signals;

processing the electronic signals using the integrated circuit;

shielding some of the electronic signals from the antenna with the device; and

reflecting others of the electronic signals towards the antenna with the device.

57. The method of operating a radio frequency identification device according to claim 56 further comprising shielding using a ground plane.

58. The method of operating a radio frequency identification device according to claim 57 further comprising electrically grounding the ground plane.

59. The method of operating a radio frequency identification device according to claim 57 further comprising insulating the antenna from the ground plane.

60. A method of communicating comprising:

providing a radio frequency identification device having a processor, transponder circuitry, an antenna, and a conductive layer spaced from the antenna;

receiving a plurality of electronic signals using the antenna and transponder circuitry;

processing the electronic signals using the processor; and

using the conductive layer, shielding some of the electronic signals from the antenna and reflecting others of the electronic signals towards the antenna.

61. The method of communicating according to claim 60 further comprising grounding the conductive layer.

62. The method of communicating according to claim 60 further comprising:

supplying operational power to the integrated circuit using a power source; and

grounding the conductive layer using the power source.

63. The method of communicating according to claim 60 further comprising generating an identification signal responsive to the processing.

64. The method of communicating according to claim 60 wherein the processing comprises detecting a predefined code within the electronic signal.

65. A method of forming a radio frequency identification device comprising:

providing an insulative substrate having a support surface;

providing a ground plane over substantially the entire support surface;

providing a dielectric layer over the ground plane;

forming a via through the dielectric layer;

printing a conductive trace over the dielectric layer, the printing of the conductive trace forming first and second antennas and a conductive connection, the conductive connection being formed within the via and connected with the ground plane;

conductively bonding an integrated circuit with the first and second antennas and the conductive connection, the integrated circuit including a modulator configured to communicate an electronic signal and a receiver configured to receive an electronic signal;

conductively bonding a battery having a power terminal and a ground terminal with the conductive trace, the bonding electrically connecting the power terminal and the ground terminal of the battery with the integrated circuit;

electrically connecting the ground plane with the ground terminal of the battery through the conductive connection and the integrated circuit;

encapsulating the conductive trace, the integrated circuit, the battery and at least a portion of the dielectric layer using a flowable encapsulant;

curing the encapsulant; and

forming a housing including the cured encapsulant and the substrate.